EPA Comments on Proposed Chemical Degradation Rates:

Introduction:

Chemical degradation rates are a key component of the contaminant fate and transport model for the Portland Harbor site. Further, sediment half-life has been identified as a sensitive parameter in the hybrid model report. In the hybrid model report, sediment half-life was used as a calibration parameter. However, EPA did not believe that the calibration data set was sufficient to calibrate the model and instead proposed a model testing approach. For the model testing approach, EPA recommended evaluating the literature to select initial sediment half-life values, running the model, evaluating model performance and adjusting the sediment half-life as necessary.

On July 24, 2008, the Lower Willamette Group submitted a table of chemical degradation rates for fate and transport modeling. EPA agreed to review the rate ranges and select several increments that LWG should use in the model testing phase.

Comments:

The chemicals presented in the table shown here are consistent with the agreed upon list of chemicals for fate and transport modeling. EPA acknowledges that specific PCB congeners for modeling need to be selected. EPA expects that the determination of which PCB congeners will be modeled will be determined in conjunction with our discussions of which congeners will be selected for PRG development.

For most of the chemicals of concern (COCs), EPA recommends using the slow or mid-range half lives presented in the table. The values presented are generally conservative and match values readily available in on-line search engines such as the PBT Profiler (www.pbtprofiler.net) and the HSDB (http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB). The latter database was included in the references to the table of half lives. However, for some chemicals, selection of a half life is problematic. For example, many PCB congeners do not degrade all the way to non-toxic daughter products, so a fraction of the PCBs may ultimately disappear, but the remainder persists indefinitely. The same is true of DDT and DDD as well which typically degrade to DDMU and stop. In general, literature-based degradation rates are estimated based on the disappearance rates of the starting chemical and are typically not mineralization rates. As a result, sediment half-lives should approach infinity for DDD, DDT and PCBs. In summary EPA recommends using a half-life of 10^{10} for PCBs, DDD and DDT and use the largest or mid-range half lives for the other chemicals.